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PROGRESS REPORT ON LOCUST WORK SINCE JUNE, 1913.

By H. C. Pratt and F. W. South.

The casual observer in Negri Sembilan and Selangor cannot but have been impressed with the very marked increase of locusts which has taken place in this country during the period which has elapsed since Christmas last. Their appearance before this date was confined to comparatively few centres and the swarms were by no means large. At the present time there are numerous flying swarms of locusts in Negri Sembilan and this in spite of the fact that approximately in round numbers 150,000,000 hoppers were destroyed in this State during the month of June and July. The destruction of these insects was largely carried out while the work was in an experimental stage and not more than 10 coolies per day on an average were employed. It should also be borne in mind that the swarms dealt with were small and scattered necessitating successively removing the apparatus in the course of one day for distances varying from ½ to 8 miles at a time. It was found impossible even with the aid of motor transport to remove and set up the apparatus more than three times in one day. On an average such swarms cover an area of 50 yards square.

In Selangor on the other hand at the present time (Sept.) the majority of the insects are in the hopping stage and only a few flights have been reported during recent weeks. The area covered by the swarms of hoppers varies enormously in size, the range being approximately from 50 yards square *i.e.* 2500 square yards to 600,000 square yards. Such swarms are numerous, especially the latter, in comparison with those that have been found previously. The insects composing them are in all stages of their development from the minute black hopper just hatched from the egg to the large yellow and black insect in the 5th stage of its development

which unless destroyed will reach the flying stage in a few days' time. These swarms are mostly confined to big tracts of waste land, principally mining districts where the vegetation is not abundant, but where sparse lalang and other grasses are readily available. Such swarms come under public notice only occasionally when they cross or travel along the roads. At such times, however, judging from recent notes and letters in the newspapers, some interest is taken in their appearance, although they are not given so much prominence as the flying swarms.

Distribution.

As has already been stated locusts in Negri Sembilan are now almost entirely in the flying stage and may be found practically all over the State. A few swarms of hoppers occur in the Coast District near Port Dickson which are being destroyed by the special Assistant to the Agricultural Inspector, recently appointed to take charge of the work there. Provision is now made as regards staff and labour for dealing with the progeny that must needs result from these somewhat numerous flying swarms. The apparatus required however is at present deficient owing to the exhaustion of the supply of necessary material available locally. It is expected that this will shortly be remedied.

In Selangor hoppers did not commence to appear until the beginning of August after which swarms have been reported in increasing numbers up to date. The first swarms were found at the end of the Damansara road and these were dealt with as efficiently as was possible. Since that time numerous and large swarms have developed in the mining land near Setapak village, along the Ulu Gombak and Klang Gates roads, near the Rifle Range, in the neighbourhood of Ampang, on the Circular road as far round as Pudu road, and the Race Course. Other swarms have made their appearance on the Sungei Besi road up to the 5th mile, in the Chinese Cemetry under Petaling Hill, on the Petaling road as far out as Batu Tiga, at the European Hospital and in certain other localities near Kuala Lumpur.

The district round Kuala Kubu and also that round Rawang especially in the direction of Kuala Selangor, form two other centres of distribution and at a moderate estimate 100 swarms occur in these two localities. The locusts are also developing at and near Kajang along the Kuala Lumpur-Kajang road and on the Cheras Sungei Besi road. Others again are reported between Klang and Kuala Selangor. Thus there is in Selangor alone a formidable list of swarms that must be dealt with in the course of the next four weeks if they are to be destroyed at all, as after that time they

will be fully developed and it is not possible to deal effectively with the flying insects.

So far as is at present known the only reliable report of locusts in Perak refers to one swarm which flew over Tapah Road a short time ago. Other rumours have reached the Department but have not been substantiated. The extensive open tracts of land in Perak formed by abandoned tin mines would provide admirable breeding grounds and offer facilities for much more rapid increase than has taken place in Negri Sembilan or Selangor. Every effort is being made at the present time to prevent their spread in a northerly direction especially in view of the large areas of padi and young coconuts which would be laid open to their attacks.

It may be noted before proceeding to the next portion of the subject that during 8 days in the month of August, this being all the time available from work connected with future organisation and the inspection of the swarms reported daily, a total of about 16,000,000 insects was destroyed with the aid of a gang averaging 10 coolies each day. From September 1st to September 20th during which time the newly appointed officers have been at work approximately 80,000,000 hoppers have been exterminated and nearly the whole of these were in the Kuala Lumpur district and with one set of apparatus. They represent a very small proportion of the total number of swarms requiring to be dealt with, and it has been the object of the officers in charge of the work to deal with the large swarms first, while special attention has been devoted to the Kuala Kubu district as being the most northerly point of their present distribution in the hopping stage.

Food Plants and Damage Caused.

By far the most important of the food plants of these insects are those belonging to the family of grasses, more especially lalang and love grass found commonly along all the roads. These form their staple food supply and as long as they are confined to this diet, the locusts cause but little damage beyond giving a temporary check to pastures. Should their numbers continue to increase, however, at the same rate as they have done in the last few months the supply of these plants would be insufficient and the insects would be driven perforce to turn their attention to several other kinds of food especially coconuts and padi to which even now they are distinctly partial. Reports have reached us of damage done to both these crops in certain districts, though at present it is comparatively limited. Young coconuts have been destroyed outright by continued attacks of flying locusts and hoppers eat down

the padi to below the water line, swimming about from plant to plant in the padi sawahs and crossing intervening streams to obtain it.

Of garden plants the popular bamboo is very liable to be attacked and several handsome hedges have been temporarily damaged near Seremban and Kuala Lumpur. It is remarkable to observe the rapidity with which a swarm of hoppers will utterly defoliate even a thick hedge of this kind. Tennis lawns and Golf greens or courses, not to mention padangs and race courses, have been rendered brown and unsightly by these insects in the course of a few hours. In the Malay kampongs sugar-canes, bananas and pine-apples as well as padi and coconuts are eaten but not at present to a serious extent. Some damage is also inflicted on Chinese gardens.

In the case of rubber very little harm has been done up to the present, except where flying insects have settled on the branches in sufficient numbers to break them by their weight or to snap the main stems of younger trees. They will occasionally nibble the edges of fresh rubber leaves but do not appear to care for them. Only when they are dry enough for the latex to become coagulated or to lose its properties will the locusts eat them with any relish. Should their numbers increase largely serious damage might be caused to rubber by breakage alone.

Methods of Dealing with Them.

It has been mentioned before that numbers of insects have been destroyed and it is proposed now to give a short description of the method employed for this purpose.

It is not possible in the space available to give a detailed description of the apparatus, and a further publication will shortly be issued by the Department.

The methods most commonly used in other parts of the world where conditions are similar is the driving and pit system. Such a system is suitable in this country only in the case of small swarms where a large amount of labour is available. To use this method generally would entail the employment of an immense labour force and much expense in digging ditches, for in dealing with a pest so general as locusts the character of the native, whether indolent or industrious has to be taken into consideration. Moreover the hoppers are able to make their way out of pits of almost any depth unless killed upon entering them or prevented from escaping by a gang of coolies or other means. Certain planters here have used this method successfully with very small swarms of hoppers but require a large number of men in proportion to the

result obtained. The method can only be recommended where the apparatus about to be described cannot be obtained. One method of dealing with the hoppers which is successful, where the nature of the country permits of its employment, is to drive the hoppers into drainage ditches or other small collections of water where kerosine has been applied to the surface. Although able to pass a barrier of water, and to continue alive in water for a considerable time, the film of kerosine on the surface of the water rapidly causes their death. These methods are however merely side issues to the one now adopted in this country.

Arsenical poisons would probably prove effective if applied on a large scale but the promiscuous poisoning of grasses which would be essential is fraught with too much danger to native owned cattle, pigs, and other animals to make extensive application desirable. It is hoped however, in the near future, to test its efficacy under certain conditions and with special precautions.

Spraying with kerosine where used in strong emulsion on the young hoppers is very deadly in its effects. Up to the present the damage it causes to the rubber fittings of the sprayers has prevented its employment on a large scale. It is also rather expensive. In spite of these drawbacks it is intended to continue experiments with this emulsion on the assembled swarms in the early morning and evening; between the hours of 6 and 7 in the morning and 6 and 7 in the evening, it is the habit of the hoppers to congregate into dense masses when on account of the cool atmosphere and absence of sun they are stationary.

The mainstay of any method in a country such as this consists in driving the young hoppers into V or W shaped enclosures which end in special traps constructed for the purpose. These traps are very portable and do away with the necessity of digging ditches and are most successful in preventing the escape of the insects once they have entered. They were designed by the Entomologist with the assistance of the Assistant Agricultural Inspector Mr. Norris, and can be erected in the course of three minutes by three coolies. They consist of strong canvas bags, brown or white in colour, preferably the former. The entrance to the bag is two feet high and is approached by an inclined plane 4 feet each way, which is also the width of the bag. The remaining two sides and back of the bag are 4 ft. 6 ins. high and the two sides are prolonged into two wings 4 ft. in length and attached at the bottom to the sides of the inclined plane. The whole is supported by iron stakes furnished at the top with hooks from which the bag is suspended by steel rings sewn on to the material at the corners. The same means is also used to support and stretch the wings. The shape

of the bag is preserved by 4 bamboo poles run through folds two feet from the ground. These bamboos are held in place by iron stakes with rings at the top. Against the front bamboo the inclined plane is stretched being held in position by a bamboo run through a fold at the bottom and fixed to the ground by short iron or other stakes. To prevent the escape of hoppers below the wings and inclined plane a little earth is thrown on the wings and in front of the inclined plane.

The escape of the hoppers from the bag is prevented by strips of American cloth from 6 ins. to 12 ins. wide which are sewn on the inside from the height of the opening downwards. The sides of the V or W enclosure consists of strips of strong calico 4 feet 6 inches wide and in length of 15 yards. This material is very portable. On the inside two parallel strips of American cloth 6 inches wide are sewn at the height of 3 feet and 4 feet from the bottom. At the top is attached a rope strongly sewn on with twine leaving apertures every inch. The sheeting is suspended from iron stakes 4 feet 6 inches in length furnished with a hook and over which the rope is hung. The sheeting is held down by a continuous line of soil, this being always available. A quarter of a mile of this apparatus can be placed in position before an advancing swarm by 10 proficient coolies in half an hour. Moreover it is easy when the swarm is inside the enclosure to cut off their retreat by closing the open end of the V or W. It has been found that when a large swarm of hoppers has eaten out the available food supply behind it that they will pour into trap bags for eleven hours without stopping necessitating the erection of further traps, or changing those that are full, and this with practically no driving. It is a remarkable sight to see these insects hopping towards the trap, pouring up the inclined plane and dropping into the trap in a stream that is almost as regular as a stream of water, killing each other by their weight and struggling inside the trap. Circling out of the V may occur but can be stopped either by placing subsidiary traps on the arms of the wings and facing the original trap, or that which is easier by modifications in the erection of the sheeting. In most cases it is desirable to drive the swarms by means of coolies placed behind them.

In one instance in the neighbourhood of Setapak village with 3 traps, 300 yards of sheeting and 15 coolies, 40 bushels of the young 2nd instar, under very difficult circumstances were destroyed, this would be in round number about 2 million insects. The swarm of which only a portion was caught during the day, extended right through the village and for ½ mile along the high road. The hoppers were eating the food displayed in the shops, entering the

food that was being cooked, choking the concrete drains, and affording a source of annoyance to the housewives, a source of amusement to the children, and a handsome feed to the fowls and ducks of the village.

Organisation.

Special measures for dealing with this pest have already received the sanction of the Government and provision has been made for the necessary expenditure connected with the organisation recently started. Five Special Assistants have been appointed and have been supplied with the adequate labour force. It is hoped also that the delay in the supply of apparatus will soon be overcome and that they will be enabled to deal with much larger areas than is at present possible and in Malay districts to requisition the services of natives of the country.

Three of these officers are now in Negri Sembilan and two in Selangor. They are responsible to the Assistant Agricultural Inspectors in each State to whom all enquiries and all information regarding the position of breeding grounds and swarms should be addressed.

Rewards have been offered to natives for information as to the locality of breeding grounds or hoppers, and by this means hundreds of swarms have been located. There is, however, a danger that in a country such as this many may go unobserved. Every effort will be made to overcome this as it affords the chief obstacle to the successful eradication of the pest. It is, however, confidently hoped that in the course of 12 months a very considerable decrease in the numbers of locusts will be recorded.

The Department takes this opportunity of thanking District Officers, Land Officers and planters for their assistance, especially in locating swarms and breeding grounds as well as in other matters.

THE ROSELLE.

The Roselle (*Hibiscus subdariffa*) is fast becoming popular as a horticultural product, on account of its usefulness as a preserve and its wine making properties. The plant grows and fruits well in this country and in fact all over the tropical world.

Seeds of this plant were sent to this Department from the Philippines and were received here last May. These were sown almost immediately and the result is they have grown and fruited well, within four months of sowing.

Very little has been written about the roselle in this country and it appears to be very little known. Yet it should be quite a useful crop on a small scale for both Europeans and natives on account of the pleasantly acid flavour of the preparations made from the plant; a flavour which strongly resembles that of the cranberry. Considering also that the requirements of the plant are so few and its cultivation so simple the roselle should become an indispensible plant in every garden.

It would appear that the culinary uses of the calyces were first appreciated in Jamaica early in the eighteenth century[1] for although the acid properties of the plant were known by those who described it after its first appearance in Europe, there is no evidence that they were aware of the utility of the calyces; and yet the use of the leaves for pottage or "greens" was known in Java as early as 1658. Notwithstanding the early mention of the roselle from Jamaica the plant has never become of much importance in the W. Indies. In India it has been grown chiefly for its fibre; the leaves and young plants of the stem are also used in the latter country as a vegetable.

The roselle has long been cultivated in Mexico, parts of Central America, the W. Indies, and during the last few years interest has been taken in it in South Florida, Texas and California. It has been reported to be a horticultural crop of some prominence in Queensland, Australia, but in later years the cultivation has dropped off in that country. About 20 years ago[2] two preserving factories are reported to have been in operation there, and roselle jam is said to have been exported to Europe in large quantities in 1896[3]. Granting that the authorities quoted were correctly informed it would seem that the roselle preserving industry in Queensland has suffered a decline, since the Census in the annual report Queensland Dept. of Agriculture 1909 gives as under cultivation there, only about three acres producing about 781 bushels of calyces.

The roselle is a native of the Old World probably India and adjacent Islands. It was recorded in Europe in 1576[4] but it is not known how it was introduced there. The plant had found its way into a Botanical Garden in England as early as 1596[1] and was probably brought from there to Jamaica . It was not recorded from that island however, until more than one hundred years later. The roselle was introduced from Jamaica to Florida in

1. Sloam H., Natural History of Jamaica.
2. Semler H. Die Tropische Agriculture 1892 p 391.
3. Rep. Cal. Agr. Expt. Station 1896-1897. p. 582.
4. Philippine Agr. Review No. 3, 1912.

about the seventies, or eighties of the 19th century and was first grown in California from seed sent from Australia about sixteen years ago.

The plant was known in Java about the middle of the seventeenth century; yet it seems very little known in this country, and it was not until quite recently that it was introduced into the Philippines and then from the Western Hemisphere.

The Roselle somewhat resembles the cotton plant in habit and branches profusely. The leaves are, on the young plant, entire, and as the plant grows change to palmately five parted, sometimes rather obscurely so, the leaves in the axils of which the flowers are borne are three parted or entire. The flowers are large pale yellow with a dark red eye, almost sessile, and usually borne singly in the leaf axils. In rich soils, (if the plant are well cared for and have a moist season to grow in) they sometimes exceed 6 feet in height with a like spread.

Two very distinct types of Roselle exist; one containing a red pigment that gives the brilliant red colour so characteristic of all products made from the plants of this type, and one type lacking this pigment, all parts of the plant being greenish and the calyces straw coloured or whitish. The jelly made from this latter type of roselle is straw or amber coloured.

Varieties:—While the usefulness of this plant for fibre and for culinary purposes has been known for some time the roselle is of so comparatively recent cultivation that there has scarcely been time for the splitting up of the species into many different varieties.

De Candolle in his "Origin of Cultivated Plants" published in 1882 does not mention the roselle; this points to probability that its cultivation was only taken up within quite recent times. A variety having green stems and leaves with straw coloured or white calyces was recorded by Hughes in his Natural History of Barbadoes 1750 p. 204 but how long it had existed before that is not known.

Among the red stemed type there seems to have been no distinct varieties recognized until "Victor" was named in 1907, by Mr. P. J. Webster now Horticulturist to the Philippine Bureau of Agriculture. This variety originated among a number of seedlings grown by him in 1904 at the Subtropical laboratory Miami Florida. The strain from which this variety originated had been introduced into Florida from Jamaica.

The following descriptions are quoted from the Philippine Agricultural Review Vol. v. No. 3, p. 126.

"Victor:—This variety is distinguished by having the unifoliate leaves of the young plants change early into leaves deeply

five lobed, these leaf characters remaining until the flowering period when the leaves become three parted, or again unifoliate. The stems and calyces are reddish. The pollen is a golden brown. The calyces average about 45-50 millimetres in length and 28 millimetres in equatorial diameter, tapering towards the apex. The calyx lobes are longer and more slender than in " Rico " and are curved upwards. The Victor is more upright in habit than the Rico and somewhat earlier in fruiting due probably to its having been cultivated in florida for several years.

" Rico :—The young plants of Rico retain their unifoliate characters longer than Victor, and later are mostly tripartite instead of five parted. The stems and calyces are dark red and the leaves golden yellow. The calyx is of about the same length as the Victor but of greater equatorial diameter; the fleshy spines subtending the calyx lobes are stout, and stand at nearly a straight angle from the axis of the fruit; the apex of the calyx lobes are frequently uncurved.

" Rico has been described from plants grown from seeds obtained by the writer from Mr. J. E. Higgins horticulturist of the Hawaii Agricultural Experimental Station and has probably descended from a variety grown in 1902 at the Agricultural Experimental Station Mayaguez, Porto Rico by Mr. O. W. Barritt, now chief of the division of Experimental Stations of the Philippines.

" The white fruited roselle is of more upright growing habit than the Victor or Rico, but is less vigorous than either. The calyces are very much smaller than those of the above named varieties and are whitish or straw coloured."

Cultivation :—The roselle will thrive in any good soil that is moderately rich in the necessary plant foods. It grows quickly and requires abundant moisture but well drained land is necessary for its well being.

Too much nitrogenous manure should not be supplied to these plants as they tend to develop into large plants at the expense of their fruitfullness. Stable manure should therefore be only sparingly supplied and this should be supplemented by phosphates and fertilizers containing potash.

The seeds should be sown thinly in a seed bed made up for the purpose and from there transplanted to the field or garden when the plants are about 5-6 inches high. The transplanting should be done preferably on a dull day, or late in the afternoon. Before removing the plants from the seed bed they should be well watered and the majority of their leaves should be cut off. In transplanting make a small basin round each plant and water it

well, unless the soil is fairly well moistened or the work is performed in rainy weather.

Before transplanting the land should be chankolled or dug deeply and the soil well pulverized as the plants have a rather deep growing root system.

The plants should be transplanted in rows about 6 feet apart and about 4 feet apart in the rows. If the object is to utilize the leaves and stems for syrup, jelly, etc., or if the plants are grown for fibre the seeds should be sown thinly in drills about 3-4 feet apart.

During the early stages of growth the weeds should be kept down by frequent cultivation; as soon as the plants have attained sufficient size and spread to shade the ground and choke the weeds cultivation may be discontinued.

If the plants are pruned to within fifteen inches of the ground after the crop is gathered the plants will sprout again and give a second crop of fruit. It is doubtful however if this treatment is preferable to the handling of the roselle as an annual and making a new sowing for each crop.

Yield:—Mr. P. J. Webster* "found that the average yield of the Victor variety in South Florida was 5·6 kilograms per plant from the first bloom: the second bloom yielded 1·7 kilograms, making a total of 7·3 kilograms. This variety planted 2·5 by 3 meters apart, 1,300 plants to the hectare, would produce in round figures 9,500 kilograms of calyces per hectare if every plant bore its proper quota of fruit. In Hawaii a yield test of a variety obtained from Porto Rico indicated a crop of from 6,750 to 7,875 kilograms per hectare."

Henrickson‡ quotes the yield of the ordinary roselle as four pounds per plant averaging two pounds of calyces and adds "Plants observed at Pueblo Viejo in sandy loam were estimated to yield double that amount."

The writer found that plants grown here yielded about 2½ lbs. per plant from the first picking. These plants were planted very close together and on poor soil so this yield cannot be taken to represent the yield of plants grown on fairly good soil with plenty of room to develop.

The yield of herbage in the Philippines was found from experiments carried out there to be:—From the first cutting April 10, 3,900 kilos per hectare from plants about 50 centimeters in height. These were cut down to about 6 to 10 centimeters from the ground, the weeds were hoed out between the stubble and the

* The Philippine Agricultural Review No. 3, 1912.

‡ Bul. 171, Office of Expt. Stations U. S. A.

land irrigated. The stubble sprouted again and within one month the field was ready for the second. This yielded 4,300 kilos of herbage. A third cutting of 9000 was made in July 2nd. Two or three rows of stubble were then taken out and the middle space cultivated,thus leaving the old rows of plants 1·8 meters apart. Again the plants started to grow and were allowed to blossom and fruit.

The first harvest of calyces was 2,120 kilos made on October 31st. The second November 14th, yielded 2,300 kilos, the third December 11th, 1,800 kilos, a small fourth gathering was made in January, but was unrecorded. The total yield in round figures was 17 tons of herbage and 6 tons of calyces. If grown from the calyces alone experiments in Florida and Hawaii indicate that an annual crop of more than 6 tons of fruit per hectare may be expected.

From these figures it would appear to be a profitable crop providing a market could be found for the products. This is where the drawback would appear in cultivating this plant commercially, as there are no preserving factories within easy reach of this country to whom the produce may be sold. It is a plant that may be grown however by every one on a small scale for culinary purposes, and as the plant appears to grow and yield well all the year round, by successive sowings of seed the fruits may be had continuously.

Roselle preserves:—Jam and sauce can only be made from the calyces but jelly may be made, not only from the fruits, but from the leaves and tender stems. That made from the herbage lacks that brilliant colour and transparency which distinguishes the jelly made from the calyces, neither does it form jelly so readily. Both herbage and calyces make an excellent table syrup which may be used in making cooling drinks. In the West Indies a wine is made from the calyces.

In making jelly it is not necessary to remove the seedpod from the calyx; this must be done however in making jam and sauce. The seeding is done by cutting off the stem and basal end of the calyx and forcing the seedpod through the apex.

Jelly is made from the calyces as follows:—Rinse the calyces well, put them in a saucepan (of granite, porcelain, or if iron it should be enamelled on the inside as the juice corodes metal) with just enough water to cover the calyces, boil them until they are soft, strain the mass through a cloth bag, measure the juice and add an equal amount of sugar, liquid measure, and boil until jelly is formed, which will be in from 10-20 minutes.

After the juice has been strained off the calyces, if they have been previously seeded, they may be made into jam or sauce. They should be washed, sugar added to taste and the whole boiled for a few minutes. Prepared in this way the calyces are excellent for eating with meat, like cranberry sauce.

For making jelly from the herbage the plant should be cut well above the ground so as to leave sufficient stubble to sprout again. When the plants are about 2 feet to 2 feet 6 inches tall is a suitable time to cut. Rinse the material and cut it sufficiently small to allow it to be placed in a boiler. Pour on boiling water until the stems are just covered after they have wilted, then boil from three to five minutes; then pour off the juice, strain, measure, and return it to the boiler and boil till the juice is reduced to about one third; then add sugar equal to the amount of the juice before its reduction, and boil until jelly is formed, which is usually from five to ten minutes. If desired lemon or lime juice may be added at the rate of one lemon to six glasses of jelly.

Syrup is made according to the same formula, but the boiling is of shorter duration; mixed with water the syrup makes an excellent cooling drink.

Another method of making syrup is as follows:—"The plant should be harvested while still of moderate growth, with tender stems and at least half matured calyces while perfectly fresh, chop the plant into length of about 10 centimeters and pack in a keg or earthenware jar. Metal containers are attacked by the acid and are not to be used at any stage of the process. Pour in sufficient boiling water to cover the plants, and then cover the keg to exclude dirt and moulds as much as possible. Allow this to stand two or three days to extract the soluble material, then filter through muslin or other suitable cloth. This gives a red liquid with a strong acid taste and pleasant fruity smell. Boil this liquid in an enamelled dish until it reaches about one-third its original volume and add sugar to suit the taste. About equal volumes of sugar and concentrated juice will usually be satisfactory. Continue the boiling with constant stirring until the sugar is completely dissolved, and bottle while hot. If desired the juice of a lime may be added to each liter of syrup. The resulting syrup has a very attractive taste and makes a refreshing product when added to water or used as a basis for sherbets, water ices, and soda water."

Roselle Wine.

"Roselle wine may also be made from the entire plant although here again a product with rich colour and better flavour results from using only the calyces. The plant is cut and treated

as in making the syrup. After filtering through cloth, the juice is placed in a clean cask previously scalded out with boiling water. For every four liters of juice use one kilo of sugar made into a thick syrup with boiling water and poured into the juice. Suspend yeast in warm water, add this to the contents of the keg and mix thoroughly by stirring. The keg should now be carefully covered or if one with the end on has been used the bung hole may be stopped with loose cotton.

To obtain a good wine foreign ferments should be excluded. The cask is then put aside and allowed to remain undisturbed during fermentation. Within a week this will near completion. If a sparkling wine is desired, the juice is racked off before fermentation has stopped and stored in bottles with corks securely wired to prevent expulsion. If a still wine is to be made, the bottling is delayed until fermentation has ceased. Age will improve the flavour and bouquet, but the young wine is very attractive in taste and appearance. As made from the entire plant it has a little reddish colour and sweet refreshing taste."

Jam.

"Wash six lbs. of fruit, open and remove the seedpod. The weight of the flesh will be about three lbs. Add two cups of water to the calyces and cook about an hour until reduced to a soft pulp. Measure the cooked fruit and add one and one fourth cups of sugar to each cup of fruit and cook twenty minutes. Six lbs. of roselles will make seven lbs. of jam." (Trop. Agriculturist Vol. XXIX. p. 51).

Roselle Fibre.

In India the roselle is grown to some extent for its fibre, which is used in the manufacture of cordage and the coarser textile products. According to Watt in his Dictionary of Economic products of India the stems yield a good strong silky fibre, the Roselle Hemp of commerce, obtained by retting the twigs when in flower. The process is described as follows:—"After the plants are dried they are made into bundles and soaked in water where they are allowed to remain for a period varying from 15-20 days. After that the bark is separated by hand and well washed to free it from impurities; it is then allowed to dry and becomes available for use." It is employed by the natives for rope making it is also said to be used in the maufacture of gunny bags in certain districts of Madras.

The roselle is a plant which suffers very little from disease. A mildew is said to attack it in Florida but has not been noticed here nor in the Philippines.

The most serious enemy to the plant seems to be the root knot nematode (Heterodera rudicicola). A cheap and effective remedy for this pest has not yet been found and infested lands should not be planted. As far as I know this has not appeared in this country. Several minor insects pests have been reported to attack the plant but none have been noticed here.

On the whole the roselle is a most useful plant and can be used for a large number of purposes. Its cultivation on a large scale is handicapped except for fibre on account of its being little known and the lack of preserving factories in or near here. As I have said before however it is a plant well worth growing for its many household uses. According to report the leaves make a good vegetable; and the calyces and stems, jellys, sauces and jams which resemble closely in flavour those similar products from the cranberry; these laths have been used as a substitute in jam making.

Most of the information contained in this article was obtained from articles written by Mr. P. J. Webster in the Trop. Agriculturist Vol. XXX. 1908, and in the Philippine Agricultural Review No. 3, 1912 and No. 5, 1913. The notes on the making of wine and syrup is quoted from an article by Dr. Pratt in the Philippine Journal of science (1912) Sect. A, No. 3, pp. 201-205.

J. Lambourne.

KAPAYANG OIL.

(*Hodgsonia heteroclita?*)

By B. J. Eaton.

The following results obtained on examination of the seeds of a forest creeper, known locally as Kapayang, received from the Conservator of Forests, F. M. S., may be of interest, since the oil from these seeds may be possibly of economic value, if the plant is present in large quantities in the jungle, or is found to be suitable for cultivation.

Description of Seeds.

The seeds consist of a hard flat outer shell, of a dull drab colour somewhat resembling a mango fruit in shape but smaller, having an average length of $2\frac{1}{2}$ inches and width of $1\frac{3}{4}$ inches. The shell contains a soft oily kernel with a thin pericarp of a dry mealy nature.

The shell constitutes 55·3 per cent and the kernel 44·7 per cent of the whole seed.

The average weight of a nut was 36·0 grammes (= approx. 1¼ ozs.).

Oil content:—On extraction with petroleum ether, the kernels yielded 59·4 per cent of oil or fat, which amounts to 26·2 per cent calculated on the whole seed.

Chemical Character of Oil.

The oil yielded the following results on chemical examination:—

Saponification value	198·9
Iodine value	65·4
Refractive index	1·464
Specific gravity at 15·5° C	0·9164

The "titer test" was not obtained, and no separation of the fatty acids was made. These will probably be determined later.

The oil extracted by petroleum ether was light yellow in colour and liquid at the ordinary laboratory temperature (28° C). During the night however it solidifies partially and melts at about 25° C.

The following results published in Lewkowitsch's "Oils, Fats and Waxes" of an oil known as "Kadam seed fat" and said to be obtained from seeds of Hodgsonia (Tricosanthes) Kadam Miq., a climbing plant belonging to the natural order Cucurbitaceae, occurring in Padang, Sumatra, will be interesting as a comparison:—

Melting point	21° C
Saponification value	197·6
Iodine value (mean)	67·5

This oil is stated to consist of 80 per cent triolein and 20 per cent tripalmitin.

It is evident from these results that these oils are very similar in character and are probably derived from the same or a closely allied species.

Conclusions:—The kernels contain a large percentage of oil, and if the seeds could be obtained in large quantities would prove of commercial value, although, for export purposes, it would be advisable to remove the shell, or on the other hand, to extract the oil locally.

The oil and the seeds are used by Malays as a substitute for coconut oil for cooking purposes, and, from the fact that the seeds are supposed to be poisonous when eaten uncooked, it would appear that they contain some glucosidal or alkaloidal substance. They are distinctly bitter to the taste.

LOCUST WORK IN THE PHILIPPINES.

A Review.

A paper on the life history and methods of control of the Philippine locust appeared in the *Philippine Agricultural Review* for January, 1913.

After a brief description of the life history approved methods of control are discussed.

These are given under the following heads:—

First:—"Artificial, which includes all methods of human control, such as spraying, driving into pits, netting, crushing, burning, inoculation, poisoning, etc.," and *Secondly* "Natural, which includes influences by rain, etc."

The writers of this paper state that "by far the most important method of combating the young insects is the common pit or driving method" and that it is "almost always the best method to follow."

So far the experience gained in the Federated Malay States supports this statement, but the apparatus which is suggested for driving is cumbersome and its use would be quite out of the question in this country. Two of the main features of any campaign against the locusts, where driving is the chief method of destruction should be (1.) ease in transporting the apparatus, and (2.) the rapidity which it can be placed in position. To move large quantities of iron roofing from place to place, entails a good deal of labour and considerable expense, and when dealing with many large swarms the immense quantity of iron roofing required, in order effectively to carry out the work, would render the apparatus, at any rate in this country, quite unpractical.

The driving method is not fully described. Suggestions are made as to the size of the trenches viz: 1 metre long, 1 metre wide and 1 metre deep, and it is stated that swarms covering some 100 square yards or more should be inside the trench within one hour from the commencement of the drive. One would gather from this that the swarms to be dealt with are all small were it not for the fact that "immense swarms" are spoken of, and these I gather have a frontage of a mile, more or less. Yet no suggestion is made as to the method of dealing with these large swarms, unless it be concluded that the same iron sheeting is used. This would hardly be feasible as the quantity required to deal with a number of such swarms in one district, probably simultaneously, would prohibit its use and it would be too cumbersome to transport to the infested centres with the requisite rapidity.

Digging pits, wherein to drive the hoppers is an expensive and laborious method of dealing with them and is by no means so

effective, or cheap, as properly constructed portable traps of various sizes. A trap of the following dimensions such as is used in this country can be carried by one man: 8 yards long by 6 yards wide by 2 feet deep. For the effective driving of large swarms one should be able to set up a series of connected V's in front of the advancing swarm, and 10 coolies should be able to fix in position 500 to 600 yards of material, and several traps in the course of half an hour. This would be manifestly impossible with the pit and iron roofing system. If proper care is taken as to the position in which the traps are placed very little actual driving will be necessary. With small swarms covering, say, 100 square yards one should be able, with four men, to fix the apparatus in position, catch the hoppers, and destroy them in the course of half an hour.

The locust in the Philippines is apparently a different species from the one occurring here, but the method by which successful driving is accomplished would probably be similar in both cases. Contained in the paper are many other suggestions and statements many bearing out experience in this country. It seems a pity no description of the insect is given in any part of the paper.

H. C. Pratt.

ULU SELANGOR DISTRICT PLANTERS' ASSOCIATION.

Report of meeting held at Kuala Kubu Rest House on August 31st 1913.

The following were present:—Mr. W. De L. Brooke (Chairman), Messrs. G. E. Howard, F. G. Herose, R. M. Newton, W. Ashwin Henderson, L. W. Weddig, L. W. Tivy, A. P. Mackilligin, N. H. Dakeyne, and E. Granville Smith (Hon. Secretary).

The following visitors were also present:—Messrs. H. N. Trower, T. C. Green, N. W. Patton, G. E. Green, and E. G. Leggatt.

The minutes of the last meeting were read and passed.

In connection with these minutes the Chairman made a few remarks informing those present as to what had been done in Committee since the last general meeting on the various subjects.

Telephones. On this subject the Hon. Secretary informed the meeting as to what had been done to further the promotion of the scheme for a telephone system linking up the whole of Ulu Selangor with Kuala Lumpur and beyond.

He informed them that very considerable correspondence had passed between various Government Officials and others and himself, which had so far resulted in getting the Superintendent of Posts and Telegraphs to promise to make out estimates at once for the working of the scheme.

Three exchanges were asked for, at Tanjong Malim, Kuala Kubu and Rawang respectively.

Mr. Brooke had canvassed for subscribers to the Tanjong Malim exchange and got a list of 15. Mr. Granville Smith canvassed for the Kuala Kubu exchange and got 14. Mr. Herose did the Rawang district and got no less than 17. It may therefore confidently be expected that the scheme will go through.

It was proposed by Mr. N. Dakeyne and seconded by Mr. Newton and carried:—That the Superintendent of Posts and Telegraphs be asked to include this estimate and work in the 1914 budget and also that he be asked to give us an approximate date when these estimates will be ready." It was felt very strongly by those present that as the matter had been so long under discussion it was only fair that the scheme should be put through in 1914, especially now that the Government have been so very clearly shewn, by the list of the subscribers, that the telephone is urgently needed and likely to be very liberally supported.

Education on estates. On this subject all members had been circularised to find out what was being done and the answers had shown that the question was being or had been attended to by all.

Chinese wages. Mr. Granville Smith proposed as an amendment, which was seconded by Mr. Dakeyne and carried:—

That every estate in this association be asked to send in a statement shewing what rates they are paying Chinese for weeding, digging and tapping, so that from these replies a list of various rates may be made out and circulated and used by all as a means to try and reduce Chinese rates all round.

Rubber advertisement. A letter was read out which had been received from the Mincing Lane Tea and Rubber Share Brokers Association re a suggested organisation with the object of fostering new uses for rubber.

After some discussion Mr. Brooke proposed and Mr. Granville Smith seconded:—

" That this Association is in sympathy with the views aimed at, but they think this is a matter for Directors of Companies to decide and suggest that the Mincing Lane Association write to these Directors on the subject. Further to assist them in the matter the Hon. Sec. be asked to enclose with his reply a list of companies belonging to the Ulu Selangor District Association." This was carried.

Discharge tickets. A letter received from Mr. Macfadyen was read re a discharge ticket system now in vogue and known as the Selangor Labour Federation.

It was shown that 74 estates, at the time of his writing, had joined this federation and that its objects were to give and take discharge tickets and thereby strike a blow to crimping.

It was felt that it was sometimes doubtful whether in all cases the rules had been strictly adhered to; further, it seems to give, as at present manipulated, ample opportunity to the coolies themselves to evade.

Moreover the Association thought that an enactment, which has been proposed and may come into force, relating to the increasing of the registration fee for locally recruited coolies, would deal a far greater blow to crimping.

After some discussion the following resolution proposed by Mr. Mackilligin and seconded by Mr. Dakeyne was passed.

That with the information at present at our disposal we are not inclined to join the Federation.

A vote of thanks to the Hon. Sec. for the trouble he had taken over furthering the telephone scheme, was carried unanimously.

The meeting closed with a vote of thanks to the chair.

E. GRANVILLE SMITH,
Hon. Secretary.

KAJANG DISTRICT PLANTERS' ASSOCIATION.

Minutes of General Meeting held at 3.45 p.m. at Kajang Club 26th September, 1913.

Present. Messrs. D. Kindersley, E. M. Schwabe, E. N. T. Cummins, C. Burn Murdoch (chair), F. St. Barbe, C. G. Jeavons, F. B. Kendall, G. D. F. Sinclair, A. A. Mulloy, R. Drummond-Hay, C. P. Everard, A. C. Hayton, E. W. Tyler, H. Gough, F. B. Gough, C. H. Wilton, K. G. Furley, P. Butler, V. E. H. Rhodes, S. S. Stevens.

The minutes of last meeting were taken as read and confirmed.

Discharge tickets. Mr. Macfadyen's letter of 28th July and the rules of the "Selangor Labour Federation" were read. The matter was discussed and the feeling of the meeting on the matter was expressed by the motion proposed by Mr. D. Kindersley and seconded by Mr. E. M. Schwabe: "That, in view of the report by the Committee appointed by Government to consider the question and that other Associations do not all agree on the matter, this Association take no further action in the matter at present." Carried unanimously.

Chinese Rates. The Chairman said how desirable it was to reduce the rates and he knew every one was anxious to do so. It would be a great help in the reducing of rates if members worked together and came to an understanding in the matter. He had been in correspondence with the Negri Sembilan P. A. on the subject and our Committee had met and discussed the matter also. The outcome was that we find ourselves more happily placed than the N. S. P. A. and are able to reduce our rates well below theirs.

Further discussion on the matter ensued and Mr. D. Kindersley proposed "that this meeting agrees that the task for tapping (Cuts 2 units) should not exceed 400 trees with a maximum daily pay of 60 cents per cooly and that this arrangement be started on November 1, 1913." Seconded by Mr. E. W. Tyler and carried unanimously.

Javanese Rates. The reduction of Javanese rates was discussed and Mr. D. Kindersley proposed the following resolution "That from November 1, 1913 the rate of pay of free Javanese coolies shall not exceed 40 cents per day and Malays 45 cents per day with one paid Friday or other holiday in the month." This was seconded by the Chairman and carried unanimously.

General. The grievous conditions of the roads and telephone in the district was discussed and Mr. E. N. T. Cummins proposed and Mr. C. Burn Murdoch seconded: "That the attention of Government be brought to the very bad state of the roads and telephone in this District." Carried unanimously.

FEDERATED MALAY STATES.

Comparative Statement of Cultivated Rubber Exported, with Value and Duty Collected Thereon, during the Years 1913 and 1912.

Destination.	Exported during August, 1913.	Previously.	Total export during the year.	Export during similar period of previous year.	Increase	Decrease	Value of rubber, 1913, to date.	Duty collected, 1913, to date.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	$	$ c.
Straits Settlements ...	1,352.48	5,042.63	6,395.11	3,284.50	3,110.61	...	18,259,385	454,294.04
United Kingdom ...	833.52	6,071.55	6,905.07	3,981.25	2,923.82	...	19,884,601	497,115.02
Continent of Europe ...	129.24	791.57	920.81	574.34	346.47	...	2,641,783	66,044.57
Ceylon	47.80	358.95	406.75	220.42	186.33	...	1,190,340	29,758.50
Other Countries ...	...	...	...	10.08	...	10.08	...	...
Total ...	2,363.04	12,264.70	14,627.74	8,070.59	6,567.23	10.08	41,976,109	1,047,212.13

KUALA LUMPUR,
6th September, 1913.

W. J. P. HUME,
Commissioner, Trade and Customs, F.M.S.

Abstract of Meteorological Readings in the various Districts of Malaya for the Month of August, 1913

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	TEMPERATURE.				HYGROMETER.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Khota Bahru	...	145.	81.5	90.9	73.61	16.48	77.9	.883	75.5	.82%	...	6.49	1.15
Malacca, Durian Daun Hos.	29.861	148.6	81.9	87.2	71.7	15.5	79.	.950	...	.88	N. W.	10.67	2.51
N. Sembilan, Dist. Hospital Seremban	...	150.	79.2	88.5	71.3	17.2	75.5	.814	73.2	.81	S. W.	7 26	1 61
„ Dist. Hos. K. Pilah	...	150.8	80.	...	...	...	76.	.824	73.3	.81	..	4.66	1 50
„ „ Tampin	...	156.6	78.9	88.2	73.6	14.6	74.9	.791	72.7	.80	...	5.53	2 10
„ „ P. Dickson	...	154 1	81.4	87.1	73.8	13.3	77.2	.849	74.3	.79	...	6 62	2.41
Pahang, „ K. Lipis	...	...	79 9	88.8	67.2	21.6	75.	...	...	...	...	8.49	1 45
Penang, „ Penang	29.799	141.4	81 8	88.	73.	15.	76.9	.857	73.9	.79	...	6.15	2.20
Perak, „ Taiping	...	106.	81 4	94.	71.	23.	77.18	.882	...	85	...	3.80	1.65
„ „ Ipoh	...	...	81 57	94.	69.	25.	76.13	.830	...	.78	...	2 59	.63
„ „ T. Anson	...	...	82 95	92.	69.	23.	78.06	.896	...	.81	...	3.86	1.10
„ „ P. Buntar	...	...	82.07	92.	71.	21.	76.99	.858	...	.78	...	1.74	.50
„ The Cottage	...	...	...	...	...	...	...	...	...	...	...	7.55	1.70
Selangor, General Hospital Kuala Lumpur	...	145 2	82.	90.	75.5	14 5	78 4	.903	76.1	.82	S. E.	2.95	2 15
„ Dist. Hos. Klang	..	...	80.4	87.2	73.	14.2	75.8	...	...	...	...	4 34	.93
„ „ K. Selangor	...	...	...	87 9	70.2	17.7	...	...	...	...	...	.22	.18
„ „ Rawang	...	...	...	91.7	71.4	20.3	...	...	...	...	...	2.77	1.38
Singapore, Kandang Kerbau Observatory	29.894	152.	82.70	91.4	72.0	19.4	77.3	.858	...	.76	S. E.	2.54	.84